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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/552,546 | 08/24/2006 | Anne-Marie Bonnot | BEAUMONT-26 | 6667 |

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| EXAMINER | |
|---|---|
| MILLER, DANIEL H | |
| ART UNIT | PAPER NUMBER |
| 1783 | |
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| 03/29/2011 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/552,546 | BONNOT ET AL. | |
| | Examiner | Art Unit | |
| | DANIEL MILLER | 1783 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/30/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "thick" in claim 6 is a relative term which renders the claim indefinite. The term "thick" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is not clear what thick would be or how one would meet the claim language as written. Correction required.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jang (Metallic conductivity in bamboo-shaped multiwalled nanotubes) in view of Marty (Batch

processing of nanometer-scale electrical circuitry based on in situ grown single-walled carbon nanotubes).

3. Jang teaches CVD deposition of nanotubes onto a silicon oxide substrate having a titanium layer with a cobalt catalyst layer as claimed (see Example and figures and pages 619-622)

4. To the extent to which applicant has defined “spreading" the nanotubes on the substrate the growth process described is considered to meet the limitation (see figures); wherein the nanotubes growth spreads over the entirety of the catalyst area. Jan teaches that the diameter or size of the catalytic particles in the Co layer is responsible for the diameter sizes and growth rates of the CNTs (see 620).

5. Jang teaches CVD deposition of CNTs but is silent as to hot filament assisted CVD deposition.

6. Marty teaches hot filament assisted CVD deposition of CNTs grown from a thermally oxidizes silicon wafer (substrate’ pg 486 as required by clam 3). The sub micron contact sites or "catalytic anchors" for selective growth of the nanotubes are formed from a 50 nm thick titanium layer followed by a thin Co layer (considered to form a bilayer) formed through e-beam lithography (pg. 486).

7. Regarding claim 6, the titanium layer is taught to be a “thick” layer as claimed (see pg. 486) with a thinner Cobalt layer provided, consistent with the claim language regarding the relative thickness of the two layers of the bilayer.

8. The hot filament CVD process is used to avoid time consuming and difficult manipulation steps to form electrical contacts for desired nanoscale electronic instead

allowing growth in a single location (sub-micron) establishing good electrical contact during a single batch growth process (top paragraphs pg. 486 Marty).

9. Regarding the claims to thickness Jang and Marty are silent as to the thickness, but Marty teaches proportions consistent with the claimed ranges and Jang teaches the size and type (Co) of catalyst layer is proportional to nanotube growth and therefore a result effective variable. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed thicknesses, proportional to Marty, and optimize the result effective variable to control diameter (size) and growth rate of the nanotubes in order to provide advantageous properties such as good electrical contact and degree of control and adhesion of the nanotube to the metal contact during growth, given the growth mechanism and catalyst used. No patentable distinction is seen.

10. It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the hot filament CVD process of Marty in order to avoid time consuming and difficult manipulation steps to form electrical contacts for desired nanoscale electronic instead allowing growth in a single location (sub-micron) establishing good electrical contact during a single batch growth process (top paragraphs pg. 486 Marty) not available in prior art methods. No patentable distinction is seen.

11. Regarding claim 3, the primary reference teaches silicon oxide and the secondary reference teaches the oxide coated silicon rendering the claimed substrate coating obvious.

12. As discussed above, to the extent to which applicant has defined “spreading" the nanotubes on the substrate the growth process described is considered to meet the limitation (see figures); wherein the nanotubes growth spreads over the entirety of the catalyst area.

13. Further regarding claim 4 and 9, given the substantial similarity in the structure an composition and the use of hot filament CVD growth processes in both the art of record and the instant invention one of ordinary skill would expect that the growth process of "spreading" is substantially the same. It is noted that with respect to product claim 9 the process is not patentably distinct wherein the product is otherwise taught. In the instant case no structural or compositionally distinct product is seen.

## ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/
Supervisory Patent Examiner, Art Unit 1783

/Daniel Miller/
Examiner, Art Unit 1783